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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,890	11/27/2001	Satoru Yamagata	925-219	7689

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EXAMINER

LEE, CALVIN

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/993,890

Applicant(s)

YAMAGATA ET AL.

Examiner

Lee Calvin

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2 is/are allowed.
- 6) ☒ Claim(s) 1, 3-5, 7 and 8 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## FINAL ACTION

### *Response to Amendment*

1. The amendment of claims 1, 2, and 4, filed on May 29, 2003, is acknowledged.

### *Drawings*

2. The drawing 5D is objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "10" and "11" have been used to wrongly designate a silicon oxide film and a second insulating layer, respectively.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 U.S.C. § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by *Chen et al.*

*Chen et al* '881 discloses a method for forming a nonvolatile memory cell, comprising of:

- forming a tunnel oxide film 120, then a first conductive layer 122 as a floating gate on a substrate
- forming a source/drain region 130 on the substrate by using the first conductive layer as a mask
- forming a first insulating film 124, then a second conductive layer 126 as a control gate on the first conductive layer [Figs. 4D, 5 and cols. 2, 7-8]
- after forming the source/drain region and the control gate, etching a portion of the tunnel oxide film immediately below a sidewall of the floating gate
- forming a second insulating film 720 over the structure [Fig. 6F]

Since *Chen et al* teaches nonvolatile memory cells array [Fig. 2] arranged in a matrix on a substrate 116, wherein each memory cell has a cross section in a (1-1) direction shown on Fig. 3, *Chen et al* inherently teaches that the first and second conductive layers are patterned in stripes extending in either one of the two directions

***Claim Rejections - 35 U.S.C. § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3-4 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Chen et al* (US 5,482,881) in view of *Hong et al* (US 5,445,984).

*Chen et al* fails to teach that the tunnel oxide is isotropically etched using fluorinated acid and the second insulating film is formed by CVD. *Hong* teaches or suggests that a insulating layer is formed by CVD [col. 5] and a tunnel oxide 22 is etched by means of HF in wet etch [col. 7].

It would have been obvious to one having ordinary skill in the art to have modified the fabricating method of *Chen et al* by utilizing CVD process to form insulating film and wet etch to etch a tunnel oxide because those processes/techniques are notoriously well known in the art either to form an insulating film economically or to etch a tunnel oxide effectively in EPROM formation

***Allowable Subject Matter***

7. Claim 2 is allowed.

Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the independent claim because none of the cited references teaches thermally oxidizing the floating gate sidewall.

***Response to Arguments***

8. Applicants' argument that "*Chen's* removal of part of the tunnel oxide must be done before the source/drain region is formed" is unpersuasive. Examiner notes that in *Chen et al*, source 112 and drain 114 are formed [Figs. 4B-4D] before the removal of a portion of the tunnel 120.

Applicants also argued that *Chen* fails to disclose removing a portion of the tunnel oxide film immediately under part of the floating gate. Examiner disagrees because *Chen et al* teaches a portion of the tunnel oxide 120 being subjected to the etch, thereby resulting a gouge of depth D<sub>G</sub> in a tunnel region 140 at the edge of and underlying the floating gate 122 [Fig. 5 and col 7, ln.49 through col. 8, ln.17]. In other words, the gouging is interpreted as the removed tunnel portion.

Please note also in the rejection above, that the specific portions of *Chen et al*, relied upon by the Examiner to reject claims 1 and 5, have been pointed out.

9. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire three months from the mailing date of this action. In the event a first reply is filed within two months of the mailing date of this final action and the advisory action is not mailed until after the end of the three-month shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than six months from the date of this final action.

***Contact Information***

10. Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at 703-306-5854, Monday to Thursday, from 7 to 5 (ET). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* whose telephone number is 703-308-1323

Any inquiry relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0596. The fax phones are (703) 872-9318 for regular communications and (703) 872-9319 for After-Final communications.

CL

*C. Everhart*  
CARIDAD EVERHART  
PRIMARY EXAMINER

August 21, 2003